DOCUMENT RESUME

ED 264 701 EC 181 350

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TITLE Adapting the Environment for the Visually Impaired Student: Practical Methods and Materials to Enhance the Use of Low Vision.
PUB DATE Oct 84
NOTE 15p.; In: Sykanda, A.M., Ed.; And Others. Insight in Sight: Proceedings of the Conference on the Visually Impaired Child (5th, Vancouver, British Columbia, October 18-20, 1984). For proceedings, see ED 260 566.
PUB TYPE Speeches/Conference Papers (150) -- Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Classroom Environment; Classroom Furniture; Contrast; Elementary Secondary Education; Furniture Arrangement; Glare; *Lighting; *Mainstreaming; *Reading Instruction; Visual Environment; *Visual Impairments

ABSTRACT

Successful approaches employed by a principal of a school for blind students in supporting regular class teachers of mainstreamed visually handicapped students are reported. Four factors of importance in evaluating the environment are described: (1) appropriate work space (height of chairs); (2) color contrast problems (work surfaces of adjacent areas); (3) effective lighting (glare problems, use of individual lamps); and (4) adaptations to improve reading instruction (lighting control reading distance, materials and media, tracking skills). (CL)

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ADAPTING THE ENVIRONMENT FOR THE VISUALLY IMPAIRED STUDENT: PRACTICAL METHODS AND MATERIALS TO ENHANCE THE USE OF LOW VISION

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When it is your job (as an itinerant or resource teacher) to support the regular education teacher, who is serving a visually impaired child, it often seems that each year begins in an atmosphere of crisis. Any teacher who discovers, three days before school begins, that her classroom of thirty-three children will include a "blind" student has reason for concern. And that anxiety springs from the best motives; most instructors are well aware that the average student receives about three minutes per day of individual attention. How, then, is a blind or partially sighted child to be adequately instructed?

Nothing is more important, I feel, than answering this question well. The regular teacher must know which subjects require special books or materials; when her usual teaching methods do or do not need adapting for the visually impaired child; how she can arrange her teaching, the room or media used to include this special child. She also needs to know in what ways she can depend on you. After all, you are only in the classroom a small portion of the total teaching day. This initial consultative work will set the climate for instruction for the school year.

On my first visit with the classroom teacher, I describe the nature of my support services to her - ie: I will be assessing the child, with the goal of outlining all adaptations for vision that will help the child in the school program. To communicate these adaptations, I complete the "vision summary sheet" (see Appendix A,) which discusses where the child should sit, the type of print used for various subject matters, fatigue factors, and so forth. Only after I have completed this consultative/evaluative work for the regular teacher will I designate the scope and nature of other direct services to the child.

In addition, I discuss with the teacher the four basic factors I evaluate to determine how to adapt the environment of the classroom for the child with low vision. These factors, and a

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description of how I assess them follows:

1. How appropriate is the work space?

2. Are there any color-contrast problems?

3. How effective is the lighting? Are there any glare factors?

4. What adaptations can improve reading instructions?

HOW APPROPRIATE IS HIS WORK SPACE?

What do you do when your visually handicapped student has been seated at the front of the room or in the corner, looking either extremely conspicuous or vaguely ostracized? Generally, a student is thus seated because of the best intentions. And, to be fair, the child who needs an extra light plug for a lamp, or additional space for large print books, or to peer at the blackboard from close up, may need to be seated differentially.

There is no pat formula to solve the problem of working space. If the only way the child can read is with his study lamp, he may have to be seated next to the outlet. If the need for the lamp is marginal, social factors (being seated the same as the other children,) may be paramount. As in most decisions of this nature, common sense must rule: the student should be seated as much like classmates as possible.

One compromise that has been effective has been to suggest that the child have two work spaces: his regular desk and an additional "study centre" with his lamp, special books, magnifier, and so forth. Thus, the child completes some tasks with classmates, others at his special area.

Since space is such a premium, I make the "study centre" more practicable by providing aids that can be used by ALL the students. For example, if it fits with classroom needs, I can provide a "magnifier station," with an illuminated bar magnifier for use in dictionary work, or a "listening centre" with tape recorder and tapes. Thus, my student is only one of many using the station, and the teacher has the bonus of attractive gadgets for use by all.

If I had a choice, (and I rarely do,) I would prefer to have my student seated at a flat table rather than a desk, even though the angle of the desk top is visually better for the child. I can't fit or maintain aids like a lamp or bookstand onto the desk. They slide off or cause enormous clutter.

And speaking of clutter, many teachers of visually impaired children claim to be able to identify the work space of their student, without ever having met the child, by the amount of "mess" that surrounds the desk. Personal organization, including the ability to organize books, papers and assignments in a coherent fashion is an important skill.

To help the child, teachers have glued cigar boxes to table tops, in which the student can place his glasses, magnifiers or pencils and crayons for ease in retrieval. In some cases, special desk pockets have been used to organize paperwork. For example, one sturdy pocket is attached to the left side of the desk for unused paper, a second in the front of the desk for uncompleted assignments; a third to the right for completed work. Another successful idea has been the travelling "briefcase" composed of four accordian style folders, taped together in a graduated manner, one just below the opening of the folder above it. Each folder is labeled in large print or braille by subject matter.

Whether the student is seated at a desk or a table, he is likely to need to be near the teacher, since many adapted materials need to be handed to him easily. Usually, by sitting near a flip chart, the child can use it well, since the print is traditionally written in large letters.

For the overhead projector, there are several options. The student can sit next to the projector and use the lighted table, or the teacher can provide the student with a xerox of the acetate sheet.

The teacher has several choices about adapting the blackboard for the visually impaired student. She can seat him near it, if his vision is good enough to see at that distance, give him permission to walk up to the board as necessary, or write out the information for him to use at his desk. If I had to generalize about the best place to seat most children with low vision, it would be front-centre in the class. Interestingly enough, and with or without my help, it often happens that this is where the regular classroom teacher seats the child, through trial and error. Obviously, great minds think alike.

An easily overlooked, but important factor in relation to seating is to be sure that the child's chair is the right height for his desk or table. Posture is already a critical issue for the child; sitting at a table that reaches his chin won't help any.

Speaking of desks and tables leads naturally to the next factor I check in the classroom environment:

ARE THERE ANY COLOR CONTRAST PROBLEMS?

It has been amply documented that it is much easier to see objects with crisp color contrast than to distinguish objects of slightly differing hues. In many classrooms, this basic optical principle goes ignored. Often, we use light colored desks and tables, against light colored floors and walls. While the student with normal sight adapts easily, the lack of contrast can create a wide variety of problems for the child with low vision. Beige chairs may "disappear" into the beige floor; white paper may blend into the light wood of the desk, making it difficult to know where the edge of the paper or book is; mobility is more difficult when objects do not stand out clearly from the background.

To prevent this problem, be sensitive to work surfaces and adjacent areas. A piece of black construction paper, cut slightly larger than the page of the book, and placed behind the page, provides immediate contrast (it also cuts the amount of reflectance from the page.)

To provide contrast betweeen the desk and work materials, a typing mat (made of hard rubber so the child can write on it, such as RubberMaid manufactures,) can be placed on the desk. In a pinch, black construction paper will do. Recently, we found some floor mats in an auto store for under $2.00 each that are perfect for a desk. The obverse side is smooth, black rubber and the mats do not slip when the child uses his pencil. The benefits of non-slip surface for handwriting practice is self-evident, particularly if a child has any palsy or lack of fine motor coordination.

Take a look at the contrast between the child's chair and the floor, as well. After a classroom teacher confided to me that my first grader (who had very little vision,) had fallen twice when trying to sit down, I outlined his beige chair with black masking tape. Naturally, he retaped a large "X" on the chair and played "bombs away" for a while. But he also did not fall again.

For pre-school teachers, another seating arrangement that should be inspected for color contrast problems may be the toilet. A white bowl against light tiled flooring may present difficulties, particularly for little boys, whose aim is uncertain. Raise the lid and tape black electrician's tape around the bowl.

Take a look, as well, at any aid the child is using, such as a

magnifier. Simply place a piece of contrasting tape on the handle, to make it easy to locate.

In one case, I had a complaint from the regular teacher that the visually impaired child was taking too long to change activities, such as putting away work, getting her coat and lining up for recess.

I placed colored, reflecting tape on difficult to see areas, such as the coat hooks, door knobs and individual cubbyholes in the room, as well as her lunch pail, which was similar to many others. I supplied the classroom with a large yellow all-purpose ball, in preference to the brown one in use, so my student could find and retrieve it more quickly. I also placed reflecting tape down the four steps leading to the playground, (there was no railing,) which speeded the child to recess. And finally, a large yellow comb in her brown purse, to replace the brown comb she ordinarily used, saved a great deal of time before and after lunch.

All of these ideas enhance the use of low vision by providing for good color contrast, and are duly recorded on the "summary sheet" referred to previously for the classroom teacher. We know that many color contrast problems can be solved by the proper use of lighting, which brings us to the third factor:

HOW EFFECTIVE IS THE LIGHTING? ARE THERE ANY GLARE FACTORS?

A proper level of illumination is often the most effective non-prescription low vision aid a child can use. This means either increasing the level of illumination, or decreasing it, especially through the control of glare.

While it is difficult to generalize - each child will react individually to lighting - it is often true that children with optic atrophy, retinitis pigmentosa and retrolental fibroplasia (RLF,) will do better with high levels of illumination. This is often true of students with cortical blindness, perhaps because they often have more peripheral than central vision, and strong lighting stimulates the rods which are packed more densely in the periphery of the retina.

Children with albinism, glaucoma and central cataract often need less, or more controlled lighting. Bright light bouncing off cataracts has been likened to glare off a dirty car windshield, and the eye with glaucoma may have a cloudy, gray cornea so that light scatters through it. Albinism, of course, is the absence of pigment in skin, hair and eyes, which invariably leads to photophobia, or extreme sensitivity to light.

If the child needs more intense illumination, he should use a hooded lamp, so that the light is well diffused. It is useful to train the child to use a rheostat on the lamp (a control for increasing/decreasing the intensity of the light,) whenever possible. The lamp should be positioned on the side of the BETTER eye, so that light rays bounce into the eye with poorer vision. Because the standard table lamp is not always convenient in the classroom, an alternative is to purchase a lamp with a moveable stand, with wheels, and a 48" arm that is easily adjustable. These function well in the workshop or music room where the student cannot work at a standard desk.

As long as schools continue to use fluorescent lights - which is poor lighting for all children - the individual lamp is an extremely important aid.

Given the average illumination level in a classroom, the need for light control generally means controlling glare. For example, I have found that most aphakic children - those with cataracts removed - function well in average lighting. But given any level of glare, they have problems. This may be because the child with a cataract removed has lost the lens of the eye. The lens naturally contains a yellow pigment, by which the eye screens glare. Without this pigment, overly bright light may cause discomfort.

Some youngsters need glasses which are tinted to darken in the sun, or to use clip-on sunshades. Children who won't hear of other devices may acquiesce to a baseball cap; the visor is having a resurgence of popularity since the Los Angeles Summer Olympics.

Within the classroom, I check at different times of day for glare. The most difficult area to correct is often sunshine through classroom windows, which can make the student's desk or the blackboard unusable at certain times of the day. If my student cannot be moved out of the glare, I may request permission to cover a portion of the offending window with black matting.

I check the student's work surface to be sure it is glare-free. Too much light on a white page of print can be controlled by using a typoscope, if necessary. This is a device that looks like a black book marker, with the width of three lines of print cut out of the centre. It vastly reduced light, and thus glare, on a page and is easily constructed.

If the teacher uses television in the classroom, a color set is much preferable for low vision. It provides much better

contrast; details are more easily seen. It is especially important to leave a light on in the room, since without a light source, any television looks as if the picture is oscillating. Children with nystagmus, for example, will "oscillate" right along with the television.

Whether the child works well with more or less illumination, the control of glare is equally important. It is an irritant for anyone, especially when working on near vision tasks like reading, which is the next factor I evaluate.

WHAT ADAPTATIONS CAN IMPROVE READING INSTRUCTION?

What could be more important to the student's long term progress than reading? Here I have the opportunity to share my special perspective with the regular teacher, in terms of vision.

Visual Fatigue:

The student may be expending a great deal more physical effort in completing his work than the normal sighted child. He may need to twist his head to use his best eye, or have to bend over to get very close to his work. It may take him more time to complete a task for mechanical, not intellectual reasons. I report any necessary time adjustments to the teacher. Also, his eye condition may be such that his eyes need a rest due to visual fatigue after a period of close concentration. Photophobia - extreme light sensitivity - may also lead to fatigue.

I urge the classroom teacher to allow the child to participate in reading instruction as early in the day as is practicable, when the child is rested, and before fatigue factors intrude. In some cases, the afternoons need to be given over to less visually demanding/fatiguing tasks for the student with low vision.

Lighting Control:

I make the teacher aware of any lighting adaptations, such as lamps, typoscopes or visors worn indoors. Since the normal classroom rule is "no hats worn indoors," the teacher needs to know why there may need to be an exception.

Reading Distance:

The student should be encouraged to read at ANY confortable distance. This may literally place the child's nose on the page; it will not affect his eyes, but may very much affect

his neck and thus I may be experimenting with reading stands of various types.

No one likes reading stands much. Children find them too conspicuous; teachers find them too obtrusive, and I hate arguments. Nevertheless, after several students have needed neck braces, I find them worth trying. Any sturdy stand will do, provided it has a good shelf to hold the material and is not overly wide or tall, and will not crash to the floor when a large print book is placed on it. Here are several adaptations to make them easier to use:

-teach the child to use a rubber mat under the stand, so it does not slide around the table or desk.

-rubber bands placed on the stand, to hold the book open, make it difficult to turn the pages. An adaptation, suggested by one teacher, is to attach two elastic bands to the top of the stand, about four inches apart. A plastic eyelet is secured to the bottom of each band, which can be hooked into a screw hook placed on the lip of the stand. The band can be "unhooked" to turn the page, and frees the child's hands to use other reading aids if necessary.

-for smaller books, squeeze clips will keep the book flat on the reading stand. It's suggested they be painted black, to avoid glare under the reading lamp; clips are available from any stationary store.

-since a reading stand raises material higher than it would be were it lying flat on a table, check to be sure the table is low enough, so that materials aren't "too" high for your student.

<u>Materials and Media:</u>

I find it very useful to explain to the classroom teacher how I arrive at a choice of print for our mutual students.

I explain that normal reading distance in all but the youngest readers is about 40 cm. (16 inches). Regular print size is 1M print; larger print is the 2M print size. By making a fraction consisting of reading distance/print size, I can estimate what a child will use. Thus, for a child to use regular print, he needs vision of about 20/50 or better. (40 cm/ 1.00 M) = 40/100 = 20/50 Snellen equivalent).

It takes about 20/100 vision to read large print at a normal distance of 16 inches. (40/200 = 20/100).

Therefore, a child with 20/200 vision will read large print very successfully. He will simply bring it twice as close - that is to say, he will read at 20 cm (8 inches) rather than at 40 cm (16 inches). Now, I am personally very fond of this distance - 20 cm or 8 inches. You see; most pencils are about 7 inches long. There is a great functional advantage to the child in being able to get his pencil under his nose when doing a workbook. Takes much less time.

Most primers are large print. Often, a child with 20/200 vision or better will need no adaptation for the reader through Kindergarten, 1st and 2nd grade. Media changes enough during 3rd grade to require a new evaluation.

If the child is using a consumable workbook in these early grades, he can often use it without adaptations. If the teacher is making ditto masters from the workbook, you must adapt. Get the child his own workbook to use as a consumable.

If the teacher is creating her own dittos, ask her to clip a sheet of black carbon paper and a sheet of plain white paper to the back of her ditto master, when making the original. If she will press a little harder than usual, she has a good black and white copy for the visually impaired student.

Math books and workbooks are different, I find, from the reading materials, for example, I have had many youngsters who needed large print for readers but could use regular print for math. There are, perhaps, fewer variables in these books, and spacing and contrast in math books is carefully controlled.

Tracking Skills:

Normally sighted youngsters, learning to read, generally have some problems learning to track well. They may lose their places within a line of print, skip words, or even skip whole lines of print. My observation of children with low vision is that they have a most difficult time with anything requiring spatial abilities, such as tracking print. Therefore, I specifically assess this for the classroom teacher. (See Appendix B for my assessment tool.)

I work with the child to teach him how to best hold the book. Perhaps he should use eccentric viewing to utilize a preferred eye with better vision. He may need a bookstand or more color contrast in his work area. I check to be sure he knows where to begin reading on a page, where to look for page numbers (and whether he can see them, even in a large print book), how to turn a page and how to get from the end of one line to the beginning of another.

I may encourage the beginning reader to use finger pointing, which is an anathema to many fine primary teachers. I explain that since the beginning reader is using an average of 2.5 eye movements per WORD, (these are termed "saccadics,") moving the finger from word to word is not slowing down the child's reading. I explain that many children with low vision, particularly those with eye muscle problems, need a technique to focus the eyes onto each word. The finger acts as a kinesthetic cue to the eyes, assisting the child in controlling the tracking from word to word.

If the child is having a VERY difficult time, and it is my sense that he is somehow "overwhelmed" by the amount of symbols on a page, I may teach him to use both finger pointing and a black book marker above the line of print. (Generally, I feel a book marker should be placed above, not below, the line of print being read, so that it does not intrude on the natural flow from the end of one line of print to the beginning of the next line.) The typoscope, referred to previously, I use as a light control device, not as a book marker.

Throughout my discussion of how and why I evaluate the classroom environment for the child with low vision, I have emphasized constant formal and informal communication with the classroom teacher. Since I am, after all, only support personnel to that teacher, who is serving my student in the mainstream, the quality of his year will depend on the climate created by that teacher.

Beyond this support to the mainstream is my individual program with the visually impaired student I serve. This program will be as varied as the child's needs, but it will always include one important aspect of learning. For a visual adaptation to be realistic, it must be one that the child understands, can duplicate and will use.

Adaptations are only useful if the child can do them absolutely independently. It is the student with low vision who must understand how to adapt that environment, and that implies a great deal. It means, among other things, that the student has specific information on his own visual condition and functioning. It implies that he will have the confidence to request, if not demand, certain reasonable changes in the school program, so he can perform most fully.

It does not imply that we are discussing only older-aged students. I have found, to my vast and continuing pleasure, that it is often the four or five year old who shows

consummate common sense in adjusting to low vision.

When little Wendy was in Kindergarten, she was cornered on the school yard by three little boys who wanted to know, without any cruelty intended, why her eyes looked so big behind her aphakic lenses. "Well," said the pixie, whose red hair advertised her personality, "all it means is that instead of being pretty with little eyes, I'm pretty with big eyes." The boys - and I - nodded in total agreement.

APPENDIX A.
SUMMARY SHEETS FOR VISUAL ADAPTATIONS

Functional Vision Checklists: Summary Sheet Date _____
Student _____ Age___ Grade_____School_____
Vision Teacher _____Contact Phone _____Room_____

Physical Information
Nature of eye condition (describe in simple terms) _____
_____
Educational implications of eye condition _____
_____
Glasses prescribed _____ To be worn _____
Describe prescription (bifocal, aphakic, contact)_____
_____
Acuity - Near Vision _____ Field _____
Acuity - Far Vision _____ Color Vision _____
Preferred eye _____ Child is/is not binocular _____
Preferred field of view _____ Best gaze posture, if any _____
Photophobia_____Sunshade prescribed _____
Classroom Modifications: distance vision. Child can use -
overhead projectors _____ flipcharts _____
filmstrips _____ flashcards _____
television _____ wall clock _____
Blackboard: child should be seated:
in front row ___ front-right_____front-left ____other_____
Distance aids used _____
_____
Time adjustments (such as extra time to copy from blackboard__
_____
Classroom Modifications: near tasks
A. Reading:
Optimum reading time _____
Child prefers to improve visual functioning by _____
_____
Child's grade level when reading print _____
Print size: _____ Reading _____Mathematics
_____ Activity books _____ditto papers
_____ Dictionary _____others
Adaptations of reading materials: _____
_____

B. Near Vision aids:
Use of optical aids _____
_____
Reading stand _____Marking pen _____ Writing paper _____
Typoscope/marker_____ditto filters _____
Closed Circuit Television (CCTV):
_____best magnification _____ polarity _____ reading distance.
Special lighting required _____
Auditory (listening) program _____
Child's grade level for auditory reading: _____
Type of classwork to be read by ear _____
_____

Equipment Adaptations for Classes: will the student need special adaptations in: cooking _____ sewing_____
shop _____ laboratory _____ Physical education ____
_____

Testing Situations
Modifications required (time and materials)_____
_____

Travel Skills
Oriented to:_____ school _____ Bus _____ community.
Can travel independently _____ Adaptations for independent Travel _____
_____
Time adjustments _____
Additional notes _____
_____
_____

APPENDIX B
NEAR VISION: TRACKING SKILLS ASSESSMENT

RECORDING SHEET: VISION SCREENING

NEAR VISION

Tracking Skills	YES	NO	COMMENTS
When reading orally, does the child			
a. hold book appropriately to maximize field.			
b. know how to turn pages			
c. understand page numbering			
d. know where to begin reading on a page.			
e. track from word to word			
f. Track with:			
1. head			
2. finger			
3. one eye			
4. both eyes			
g. frequently lose his place within a line of print			
h. have difficulties reading from the end of one line to the beginning of the next.			
i. frequently omit small words - "a, to, for" - or prefixes, suffixes of words.			
j. omit words in the same general area on the page.			
k. skip lines on print			
l. misalign digits in number columns.			
m. mispronounce similar words.			
n. evidence reduced comprehension as reading continues.			
o. read at "average" speed for grade level.			
p. use book markers or typoscopes			

Other comments _____

_____